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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,570	01/23/2002	Ryuichi Otagawa	020068	7381
23850	7590	05/27/2004	EXAMINER	
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP 1725 K STREET, NW SUITE 1000 WASHINGTON, DC 20006			MUTSCHLER, BRIAN L	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 05/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,570

Applicant(s)

OTOGAWA ET AL.

Examiner

Brian L. Mutschler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20020416; 20020718.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

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DETAILED ACTION

Drawings

1. Figure 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01.

Claim 1 recites "a process for producing metal foil characterized in that..." in line 6. However, the body of the claim does not recite any method steps. Each limitation recited in the claim is a structural limitation addressing the auxiliary anode. The same applies to dependent claims 2-12.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motohashi et al. (U.S. Pat. No. 6,663,758) in view of JP 08-109490, herein referred to as JP '490.

Regarding claim 1, Motohashi et al. disclose a method for electrolytically producing copper foil using a rotating drum cathode **2** and anodes **3**, wherein the foil is continuously formed and peeled off (fig. 2; col. 3, line 14 to col. 5, line 12). In addition, Motohashi et al. teach the use of an auxiliary anode **7** positioned downstream from the direction of flow of the electrolytic solution (fig. 2). The anodes are made of titanium coated with a platinum metal oxide (col. 4, lines 39-40).

Regarding claim 2, the foil is a copper foil (col. 2, lines 14-16).

The method of Motohashi et al. differs from the instant invention because Motohashi et al. do not disclose the following:

- a. An intermediate layer of tantalum or a tantalum alloy formed between the coating layer and the substrate, as recited in claim 1.
- b. The titanium alloy is an alloy selected from titanium-tantalum, titanium-tantalum-niobium, titanium-palladium, or a combination of at least two of the alloys, as recited in claim 3.
- c. The intermediate layer is formed by sputtering, ion plating, or vacuum evaporation, as recited in claim 4.
- d. The tantalum alloy is a tantalum-niobium alloy and/or a tantalum-titanium alloy, as recited in claim 5.

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- e. The intermediate layer is 1 to 10 μm in thickness, as recited in claim 6.
- f. The valve metal is titanium, tantalum, niobium, zirconium, or a combination of at least two of the metals, as recited in claim 7.
- g. The electrode active substance is a mixture selected from iridium oxide and tantalum oxide; iridium oxide and titanium oxide; iridium oxide and ruthenium oxide; iridium oxide, ruthenium oxide, and titanium oxide; ruthenium oxide and titanium oxide; and ruthenium oxide and tantalum oxide, as recited in claim 8.
- h. The electrode active substance contains a mixture of 60 to 95 wt. % iridium oxide and 5 to 40 wt. % tantalum oxide, as recited in claim 9.
- i. The electrode active substance contains a mixture of 70 to 95 wt. % iridium oxide and 5 to 30 wt. % tantalum oxide, as recited in claim 10.
- j. The coating layer is formed by thermal decomposition, electrochemical oxidation, or powder sintering, as recited in claim 11.
- k. The coating layer is 1 to 50 μm in thickness, as recited in claim 12.

Regarding claims 1 and 4-6, JP '490 discloses an intermediate layer of tantalum or a tantalum alloy formed between the substrate and the coating to prevent the passivation of the base material (par. [0004]). The tantalum or tantalum alloy layer is formed by sputtering to a thickness of 1-5 μm (par. [0011]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Motohashi et al. to use an intermediate layer of tantalum or a tantalum alloy as taught by JP '490 because the

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intermediate layer prevents the passivation of the titanium substrate. It would also have been obvious to use a tantalum-niobium or tantalum-titanium alloy as the tantalum alloy intermediate layer because niobium and titanium have similar physical and chemical properties as tantalum, and they are much less expensive.

Regarding claim 3, JP '490 teaches that the substrate may comprise titanium, titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium (par. [0008]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the titanium substrate of Motohashi et al. to use and alloy selected from titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium as taught by JP '490 because JP '490 teaches that such materials are equivalent materials suitable for use in electroplating anodes.

Regarding claims 7-12, JP '490 discloses electrode active materials comprising platinum metal oxides, iridium-tantalum mixed oxide, iridium-titanium mixed oxide, iridium-ruthenium mixed oxide, iridium-ruthenium-titanium mixed oxide, ruthenium-titanium mixed oxide, ruthenium-tantalum mixed oxide, and iridium-platinum-tantalum mixed oxide (par. [0012]). The electrode active material is formed on the intermediate layer by thermal decomposition, electrochemical oxidation, powder sintering, or sputtering (par. [0014]). JP '490 teaches that a preferred coating comprises 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide (par. [0013]). The coating is deposited at

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a density of 2-200 g/m² (see par. [0013]), which results in a thickness within the claimed ranged based on the density of the materials.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the platinum metal oxide coating of Motohashi et al. to use a 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide formed by thermal decomposition method as taught by JP '490 because JP '490 teaches that such coatings are equivalent coatings to platinum metal oxide coatings and are suitable for use as anode coatings for electroplating.

6. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolski et al. (U.S. Pat. No. 5,215,646) in view of JP 08-109490.

Regarding claim 1, Wolski et al. disclose a method for electroforming a copper foil using a rotating cathode drum **21**, anodes **24,25**, and an auxiliary anode **27**, wherein the copper foil is continuously formed and peeled off (fig. 1; col. 5, lines 14-68). The anodes are made of platinized titanium or iridium or ruthenium oxides (col. 5, lines 29-31).

Regarding claim 2, the foil is a copper foil (col. 5, lines 21-24).

The method of Wolski et al. differs from the instant invention because Wolski et al. do not disclose the following:

- a. An intermediate layer of tantalum or a tantalum alloy formed between the coating layer and the substrate, as recited in claim 1.

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- b. The titanium alloy is an alloy selected from titanium-tantalum, titanium-tantalum-niobium, titanium-palladium, or a combination of at least two of the alloys, as recited in claim 3.
- c. The intermediate layer is formed by sputtering, ion plating, or vacuum evaporation, as recited in claim 4.
- d. The tantalum alloy is a tantalum-niobium alloy and/or a tantalum-titanium alloy, as recited in claim 5.
- e. The intermediate layer is 1 to 10 μm in thickness, as recited in claim 6.
- f. The valve metal is titanium, tantalum, niobium, zirconium, or a combination of at least two of the metals, as recited in claim 7.
- g. The electrode active substance is a mixture selected from iridium oxide and tantalum oxide; iridium oxide and titanium oxide; iridium oxide and ruthenium oxide; iridium oxide, ruthenium oxide, and titanium oxide; ruthenium oxide and titanium oxide; and ruthenium oxide and tantalum oxide, as recited in claim 8.
- h. The electrode active substance contains a mixture of 60 to 95 wt. % iridium oxide and 5 to 40 wt. % tantalum oxide, as recited in claim 9.
- i. The electrode active substance contains a mixture of 70 to 95 wt. % iridium oxide and 5 to 30 wt. % tantalum oxide, as recited in claim 10.
- j. The coating layer is formed by thermal decomposition, electrochemical oxidation, or powder sintering, as recited in claim 11.
- k. The coating layer is 1 to 50 μm in thickness, as recited in claim 12.

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Regarding claims 1 and 4-6, JP '490 discloses an intermediate layer of tantalum or a tantalum alloy formed between the substrate and the coating to prevent the passivation of the base material (par. [0004]). The tantalum or tantalum alloy layer is formed by sputtering to a thickness of 1-5 μm (par. [0011]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Wolski et al. to use an intermediate layer of tantalum or a tantalum alloy as taught by JP '490 because the intermediate layer prevents the passivation of the titanium substrate. It would also have been obvious to use a tantalum-niobium or tantalum-titanium alloy as the tantalum alloy intermediate layer because niobium and titanium have similar physical and chemical properties as tantalum, and they are much less expensive.

Regarding claim 3, JP '490 teaches that the substrate may comprise titanium, titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium (par. [0008]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the titanium substrate of Wolski et al. to use and alloy selected from titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium as taught by JP '490 because JP '490 teaches that such materials are equivalent materials suitable for use in electroplating anodes.

Regarding claims 7-12, JP '490 discloses electrode active materials comprising platinum metal oxides, iridium-tantalum mixed oxide, iridium-titanium mixed oxide,

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iridium-ruthenium mixed oxide, iridium-ruthenium-titanium mixed oxide, ruthenium-titanium mixed oxide, ruthenium-tantalum mixed oxide, and iridium-platinum-tantalum mixed oxide (par. [0012]). The electrode active material is formed on the intermediate layer by thermal decomposition, electrochemical oxidation, powder sintering, or sputtering (par. [0014]). JP '490 teaches that a preferred coating comprises 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide (par. [0013]). The coating is deposited at a density of 2-200 g/m² (see par. [0013]), which results in a thickness within the claimed range based on the density of the materials.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the platinum metal oxide coating of Wolski et al. to use a 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide formed by thermal decomposition method as taught by JP '490 because JP '490 teaches that such coatings are equivalent coatings to platinum metal oxide coatings and are suitable for use as anode coatings for electroplating.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references teach similar foil plating methods and/or similar anode materials.

U.S. Pat. No. 3,547,600 Gwynn et al.

U.S. Pat. No. 3,674,656 Yates

U.S. Pat. No. 4,318,764 Adler

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U.S. Pat. No. 4,515,673 Hayfield

U.S. Pat. No. 5,019,224 Denton et al.


U.S. Pat. No. 5,407,556 Shimada et al.

U.S. Pat. No. 6,527,939 Hardee

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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TECHNOLOGY CENTER 1700

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